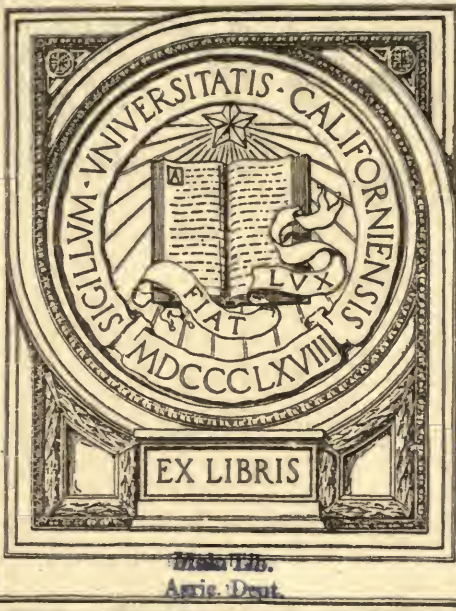

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SOILS OF THE EASTERN UNITED STATES AND THEIR USE—VI.

THE CECIL CLAY.

BY

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SOILS OF THE EASTERN UNITED STATES AND THEIR USE—VI.

THE CECIL CLAY.

GEOGRAPHICAL DISTRIBUTION.

Typical areas of the Cecil clay have been mapped by the soil survey from eastern Pennsylvania southward through the Piedmont section to central Alabama. Occurrences of the type have been encountered in the soil-survey work in 32 different areas located in 7 States and comprising an aggregate of 2,490,627 acres. The extent of development of the Cecil clay is only less than that of the Cecil sandy loam, and the former type has even a more widespread distribution than the latter. From the areas thus far encountered in the soil-survey work it is safe to estimate that nearly one-third of the total extent of the Piedmont Plateau soil province is occupied by the Cecil clay. It thus constitutes one of the most important soil types in the region, and because of its inherent properties it constitutes one of the most valuable soil assets of that portion of the United States.

CHARACTERISTICS OF THE SOIL AND SUBSOIL.

The surface soil of the Cecil clay to an average depth of about 6 inches consists either of a heavy reddish-brown loam or of a heavy red clay loam. In the fields which have been subject to the best forms of tillage the heavy reddish-brown loam may have a depth of 8 to 10 inches, while in regions where erosion has continually removed the surface soil materials the heavy red clay loam either occupies the surface or is covered only by 3 or 4 inches of the more friable soil material. In all cases the subsoil from a depth of 6 or 8 inches to a depth of many feet consists of a tenacious heavy red clay. In the majority of the areas which have been surveyed there will be found scattered over the surface and through both soil and subsoil angular fragments of quartz, or "white flint," as it is locally known, amounting in some instances to 20 or 30 per cent of the entire soil mass. Not infrequently also unweathered portions of the parent rock are still present in the form of rounded bowlders, usually deeply iron stained and segregated in those portions of the area where erosion has most nearly kept pace with the weathering of the rock. It is a distinguishing characteristic of the surface soil of the Cecil clay that it granulates readily when plowed in the proper moisture condition, and thus

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maintains an unusually favorable surface condition, unless tillage operations are carried on when there is so much moisture in the soil that the soil becomes packed and clodded. Even where excessive erosion has removed the surface soil material it requires only two or three years of careful tillage to redevelop a productive soil through the proper working of the stiff red clay subsoil. The recuperative powers of this soil after bad management and excessive erosion are remarkable.

The Cecil clay constitutes the well-known "red lands" or "mulatto lands" of the Piedmont section. It is generally esteemed a strong productive soil for general farming purposes, and with proper treatment its value and reputation would be still further enhanced.

The Cecil clay differs from the Cecil sandy loam in that the latter soil possesses a covering of the gray sandy loam over the stiff red clay subsoil. The soils of the Cecil series differ from all others of the Piedmont region, except those of the Penn series, through the persistent occurrence of the tenacious red clay subsoil under all the types of the series. The red soils of the Penn series are derived from sandstones and shales and thus may be distinguished easily from the Cecil soils, derived from crystalline rocks.

SURFACE FEATURES AND DRAINAGE.

Areas of the Cecil clay are found at all elevations throughout the Piedmont sections. The lowest altitude at which it is reported is about 300 feet above sea level in some of the Virginia areas. It occurs in all intermediate elevations in the Piedmont section up to an altitude of 1,200 feet. It is usually found upon the hilly, rolling, or broken portions of the Piedmont section and in the more southern regions is strongly developed along the stream slopes and other eroded portions of the Piedmont Plateau. In the more northern regions through Virginia, Maryland, and in southern Pennsylvania it occupies undulating to rolling or hilly locations, and its sloping surface is only interrupted by the channels of the larger streams and by rocky areas where the residual bowlders still persist. Owing to its altitude and elevation, the drainage conditions over practically the entire extent of the Cecil clay are excellent. Only in rare cases is it necessary to practice any form of artificial drainage. In the more level fields it would frequently be advantageous to install some tile drainage systems, in order to carry off excess subsoil moisture.

Excessive erosion is the greatest obstacle to the tillage of the Cecil clay. In fact, the type may almost be said to originate from erosion processes. Practically all of the rocks of the Piedmont section have been deeply weathered and the original rock masses broken down to form a complex mass of sand and clay. Upon the ridges and the more level sections where erosion is not particularly active, the

water, flowing across the surface of the fields, has only been able to move the silt and clay particles, and there has been resultant accumulation of the coarser sands, giving rise to the Cecil sandy loam. Upon the steeper slopes and in the more broken sections where the velocity of the moving water has been greater, the entire surface-soil mass has frequently been removed, exposing the stiff tenacious clays in the form of galled and gullied hillsides. Many areas of the Cecil clay have thus originated through the complete removal of the surface soils which formerly existed over their area. This mode of formation for the Cecil clay is more nearly universal in the Southern States than in the northern regions where it is found. In fact, in Pennsylvania and Maryland, where the surface of the Cecil clay is more gently rolling or undulating, it does not suffer severely from soil erosion, and its peculiarities are derived from the weathering of a particular group of crystalline rocks, some of whose minerals contain large quantities of iron. The weathering of these ferruginous minerals gives rise to the deep-red plastic clay.

LIMITATIONS OF USE.

The texture of the Cecil clay precludes the possibility of growing any special crops to advantage upon this soil. It is not successfully used for the production of any vegetable or small fruit crop, except for home consumption, and it is not adapted to the production of peaches. In fact it is strictly limited in its best utilization to the production of the staple general farm crops, and to the production of apples in the more northern locations where it occurs. For these latter crops it is a strong, durable, productive type of soil.

The principal limitation upon the satisfactory use of the Cecil clay is that enforced by excessive erosion. This difficulty is more prevalent in the more southern latitudes, where the spring season is frequently marked by torrential rainfalls resulting in the bodily removal of the surface soil from all of the steeper slopes. This excessive erosion of the Cecil clay may be prevented by proper methods of handling the type. All of the steeper slopes within the soil type should either be reclothed by forest growths or should be permanently laid down to some pasture grass suited to the climate in which the area occurs. In the extreme Southern States Bermuda grass is the best soil binder for this purpose.

In the latitude of Virginia the Kentucky bluegrass grows to advantage upon the Cecil clay and may be used for such permanent pasturage purposes. In Maryland and in Pennsylvania the ordinary grasses sown for hay may be used to advantage, and bluegrass would also constitute a valuable portion of the seeding. There are extensive areas of the Cecil clay now subject to erosion which may still be maintained in the production of tilled crops and may be utilized for

the regular rotation of the farm, provided certain elementary precautions are taken in the handling of the soil and in the planting of the crops. In the more southern sections where the rain frequently falls in torrential showers, contour farming and the establishment of terraces upon the moderate slopes should be universally followed. In the more northern regions the contour farming in laying out the rows of intertilled crops will frequently be sufficient to check erosion upon this type. In all cases where it is possible fields upon the Cecil clay should be occupied by a winter cover crop, many of which are available, in order to prevent the erosion of the bare and clean tilled soil. Throughout the area where the type occurs, winter wheat may be grown to advantage and constitutes a valuable money crop. It will also constitute an excellent winter cover crop to prevent erosion. From North Carolina southward winter oats may be used for the same purpose. In all regions the establishment of crop rotations that will occupy the Cecil clay with grass crops during a considerable portion of the rotation is to be recommended.

IMPROVEMENT IN SOIL EFFICIENCY.

The limitations of yield which hold with respect to the Cecil clay are practically all limitations of mechanical tillage and the manipulation of the soil. The problem of improving soil efficiency is, therefore, a problem of proper tillage rather than a problem of fertilization, drainage, or any other method of soil management.

The Cecil clay probably presents the greatest contrasts in yield of any soil type to be found in the Piedmont Plateau. In its more northern extension, where it has been used as a general-purpose farming soil through a long period of time, it is one of the most highly esteemed soils of the region. The yields of all grain and grass crops are above the average for the locality. In the more southern sections, where erosion has tended to destroy the surface soil, where light farming teams and light implements are used for all classes of tillage, the Cecil clay is too stiff, tenacious, and plastic to meet with the thorough approval of the farmers or to enable them to secure the best results from their present systems of cropping and of working the soil. In order that a favorable seed bed may be prepared the soil must be deeply and thoroughly plowed at a time when it does not contain an excess of soil moisture and before it has become so dried out and baked at the surface that the plow only turns over a long line of caked and clodded soil. Deep plowing and thorough subsequent tillage are fundamental requisites for obtaining satisfactory crop yields upon the Cecil clay. Wherever these requirements are met, this type rewards the farmers with abundant crop yields. Wherever they are neglected, the yields secured are correspondingly unsatisfactory.

Not only is deep and thorough tillage required, but the incorporation of organic matter, particularly coarse and strawy manures, also affects the stiff tenacious structure of the soil favorably. Even if proper tillage is successful in establishing favorable structural conditions, such as granulation and the proper loosening up of the soils, these conditions may not be maintained against heavy rainfall unless there is an adequate amount of organic matter mixed with the mineral matter, in order to retain this structure when it has once been obtained. It is therefore desirable that clover sod, cowpea vines, or some other form of green manure should be turned into the surface soil at least once during the regular crop rotation. Wherever possible, considerable amounts of the stable and yard manures should also be applied in advance of any hoed crop.

Even when the surface soil of the Cecil clay has been well prepared and well manured for the production of intertilled crops, it is frequently the case that summer showers, which moisten only the surface layer of the soil, will bring about a caked and sun-cracked condition of the surface half inch in the cultivated field. Whenever this condition arises the evaporation of moisture from the surface soil and even from the subsoil goes on rapidly, and it is essential that as soon as possible after summer rains tillage implements should be used, in order to break up the surface crust. It is not desirable to use the small-sized turnplows for this purpose, but instead some form of spiked-tooth cultivator, set to run shallow, should be employed. Failure to observe this requirement of the soil has given it the reputation of being somewhat droughty and uncertain in the more southern cotton-growing sections.

In nearly every area where the Cecil clay has been mapped the necessity for this general line of treatment has been clearly shown. In practically every area there has been a widespread discrepancy between the crop yields reported by the best and most careful farmers and those obtained by the farmers who have failed to observe the precautions mentioned. Within relatively short distances, in nearly all areas, fields exist, the poorest of which will not give yields one-third as great as upon nearby fields where the proper tillage of the soil and the adequate restoration of organic matter have been practiced.

The cost of such proper treatment and such reasonable care of the Cecil clay is so low and the rewards which are secured from them are so great that every farmer should give careful attention to the improvement of soil condition and soil efficiency through the proper handling of the soil itself. No expensive fertilizers are required—no unusual enginering methods are requisite; only the practice of the best methods of plowing, harrowing, cultivating, and manuring, which are known in each section and in each county where the type occurs.

LIMITATIONS UPON SPECIAL CROPS.

Because of its fine texture, dense structure, and rolling to sloping topography; because of its considerable altitude above sea level and its consequent cool climatic surroundings, the Cecil clay is not a soil well suited to the production of special crops. These same characteristics, however, constitute it one of the strongest and best of the general farming soils of the southeastern United States. It is so well suited to the production of the general farm crops that the introduction of special crops is hardly necessary.

EXTENT OF OCCUPATION.

Probably all except the rougher and more broken areas of the Cecil clay and some limited areas where the residual bowlders still exist have been occupied at one time or another by active tillage operations. In many instances the soil has been cleared, cultivated, the surface soil eroded away, and the type again occupied by timber growth two or three times since the first agricultural occupation of the eastern United States. At the present time considerably more than 60 per cent of the total extent of the Cecil clay is probably occupied for the production of farm crops. In the more northern regions only those areas of the Cecil clay which are too steep or too stony for cultivation are unoccupied and these are usually producing a forest growth which is of great value to the farms upon which it occurs. In the more southern regions where erosion has been unchecked, a greater proportion of the type remains unoccupied from year to year, but even in these locations it is probable that 50 per cent of the Cecil clay is annually tilled.

The areas of the type occur in well-drained regions whose climatic surroundings are favorable to plant growth and favorable to the health of the owners of the soil. It has, therefore, been sought at all times as a basis for profitable agricultural occupation.

CROP ADAPTATIONS.

The Cecil clay is marked by uniformity in crop adaptation to such a degree that only variation in climatic surroundings and in the traditional farm practices of the different regions give rise to any great variation in crop production upon the type. In all regions from Pennsylvania to Alabama corn is produced upon this soil. The variation in yield in the different locations is marked. In the more northern areas where the Cecil clay is developed, particularly in Maryland and Pennsylvania, it is esteemed one of the best corn soils of the section. Depending upon the care with which the land is prepared and the crop is tended, corn produces from 30 to 70 bushels of shelled corn per acre in both Maryland and Pennsylvania.

Southward from this section in Virginia and northern North Carolina the yields decline, until 15 to 25 bushels per acre represents the ordinary production. Thence to the southern limits of the type in central Alabama the corn yields rapidly decrease to an average varying from 8 to 15 bushels per acre. This wide diversity in the yield is due not so much to difference in climatic environment as it is to differences in the efficiency of management of the soil itself, particularly in the prevention of soil erosion. The yields in the more southern regions are practically those which can be obtained from the unskilled tillage of bare subsoils, since the surface soil is annually washing away, and only the surface 2 or 3 inches of material has been weathered out and mingled with organic matter to furnish a complete soil. In these more southern locations corn is not considered to be as well suited to production upon the Cecil clay as is cotton. The difficulty of working the land sufficiently with the light equipment used in cotton farming gives rise to shallow plowing, to plow tillage instead of cultivation, and to continual bodily losses of the surface soil, which reduce not only the yields of corn but also of other crops. Under this partially efficient tillage the surface soil in the cornfields, particularly, becomes baked and clodded and the large moisture supply demanded by the heavy and rapidly growing crop of corn can not be maintained.

The Cecil clay in all of its northern occurrences is universally used for the production of wheat. This is the principal small-grain crop produced upon the type. The yields in Pennsylvania, Maryland, and some portions of Virginia are excellent, ranging from 15 to 30 bushels per acre, depending largely upon the previous treatment of the land and upon the care with which it has been prepared for the crop. In fact the Cecil clay constitutes one of the best wheat soils east of the Allegheny Mountains, and only the Hagerstown loam of the Limestone Valleys can normally compete with this type. In the Middle Atlantic States, including North and South Carolina, wheat is an important crop upon the Cecil clay, and yields range from 10 to 20 bushels per acre. This latitude marks about the southern limit of profitable wheat production upon any soil type except at high altitudes. The yields upon the Cecil clay may therefore be considered as unusually high under the attendant climatic circumstances. Southward in Georgia and Alabama the yields are usually much lower, ranging from 5 to 12 bushels per acre, and wheat is not so generally sown as farther north.

With the proper care of the soil and with the use of organic manures for fertilizers, the wheat yield even in the most southern locations where the crop is produced upon the Cecil clay might be materially improved.

Oats are grown almost universally upon the Cecil clay. The oat crop is a summer crop in all of the more northern States, and under the cooler climatic conditions produces yields ranging from 40 to 60 bushels per acre. The grain is thrashed for use upon the farm or for sale. In some locations oats take the place of wheat as the small-grain crop, although the latter is better suited to such a heavy and dense soil as the Cecil clay. In the more southern regions the oats are grown as a winter cover crop, and, as in the case of wheat, the larger yields are only secured at the higher altitudes or under rather unusual conditions of favorable tillage. The grain is sometimes thrashed, yielding 15 to 30 bushels per acre, but it is more generally grazed off or cut for hay. The production of oats, except as a winter cover crop, upon the Cecil clay can scarcely be recommended farther south than North Carolina. For the prevention of erosion, however, the sowing of this crop upon fields from which cotton or corn has been removed is to be recommended.

The Cecil clay is the most important soil type for the production of the dark fire-cured export tobacco and of an excellent quality of plug-wrapper tobacco, which is used for domestic manufacture. In Virginia and the northern counties of North Carolina the yields range from 500 to 1,000 pounds per acre under ordinary methods of tillage, although these yields may be increased to 1,500 pounds per acre with better methods of fertilization and cultivation. The average yield obtained by the farmer is probably about 700 pounds per acre. Tobacco is normally followed by wheat and the wheat by clover. For the most successful tobacco production some leguminous crops, such as clover or cowpeas, should be plowed under, and the physical condition of the soil is still further improved by the application of lime. Extensive experiments have been conducted for the improvement of the yields of the dark fire-cured tobacco in the Virginia-North Carolina section, and the results of this experimentation are summarized in Bulletin 46 of the Bureau of Soils, The Improvement of Virginia Fire-cured Tobacco.

This bulletin shows conclusively that by the application of large quantities of properly prepared mineral fertilizers the yield of tobacco may be increased to two or three times that ordinarily secured. In order to obtain such results deep plowing of the land is requisite, coupled with the incorporation of organic manures and with the careful cultivation of the soil during the growing period of the crop. The bulletin referred to demonstrates that increased returns from the intensively cultivated crop pay for the increased cost of labor and fertilizer, and result in a larger net profit to the grower than that obtained under the ordinary methods employed in the district. Not only this, but the intensive cultivation leaves the fields in better condition for succeeding crops in the rotation and also re-

sults in increased profits from these crops. The experiments upon which these conclusions were based covered a period of three years and demonstrated also that the limits of the improvement of this soil through better methods of tillage and fertilization had not then been reached, although very satisfactory crops were obtained.

In the more southern regions the Cecil clay is esteemed as a fair cotton soil. The crop is thought to be better suited to this type than it is to corn. Nevertheless, the yields of cotton, especially in a dry season, are unnecessarily low and might be greatly improved by the proper protection of the type from excessive erosion and by deeper and more thorough preparation of the soil. The limiting condition upon the production of cotton seems to be the maintenance of a sufficient quantity of moisture to make a good growth of the cotton plant and a good fruiting of the crop. Yields of one-fifth to one-half bale per acre are secured upon the badly eroded areas with the ordinary treatment. Larger yields are secured in a wet year when abundant moisture is furnished under natural conditions. The Cecil clay, however, has been so treated by the more progressive farmers, and particularly at certain experiment station farms located upon the type that three-fourths of a bale to 1½ bales per acre have been produced on properly tilled and fertilized land. These yields were secured by deep plowing, frequent shallow cultivation, the incorporation of organic matter in the soil, and the use of those fertilizers which experience and experimentation have shown to be suited to the cotton crop upon this type. The fertilizers to be recommended usually contain rather a high proportion of nitrogen, the normal quantities of phosphoric acid, and moderate to low amounts of potash. The fertilizers upon the experiment plats where the largest yields were produced were applied at the rate of 400 pounds per acre or more, which is at least double the quantity ordinarily used upon the Cecil clay in the cotton-growing regions.

The Cecil clay in all locations where it occurs is an excellent soil for the production of certain grasses. In the more northern region the seeding is to timothy and medium red clover. Where the land is carefully worked and well fertilized, and particularly where lime is applied at the rate of 1 ton or more per acre, the yields of the mixed grasses range from 1½ to 2 tons per acre. Where less care is taken the average yield is about 1 ton per acre. In Virginia bluegrass is also grown, principally for pasturage purposes, upon the Cecil clay, and the type makes a good growth of this grass, especially if lime is applied before seeding. In the more southern areas cowpeas constitute the most important forage crop produced upon the Cecil clay. The peas are usually sown with the corn crop at the last working and either grazed off or cut for hay after the corn has been secured. The production of cowpeas, both as a catch crop in the corn and sown ex-

clusively as a forage crop, is increasing throughout the central and southern regions where the Cecil clay is developed, and the sowing of this crop is highly to be recommended. The growth of the cowpeas tends to loosen and make more friable the surface soil. The incorporation of the roots and stubble adds much needed organic matter. The use of the forage upon the farm also gives rise to larger quantities of stable manure, much needed in the proper handling of the Cecil clay. It is a common experience with those farmers who have been using the cowpea crop upon the Cecil clay that all succeeding crops in the rotation give increased yields when the cowpeas are planted. This is particularly true in the case of tobacco, corn, and cotton immediately following cowpeas in the rotation.

The Cecil clay is used to a limited extent in Georgia and Alabama for the production of sorghum for making sirup. It is not so well adapted to this purpose as the Cecil sandy loam.

Fruit.—In both Virginia and Maryland some apple orchards have been planted upon the Cecil clay. In Virginia, particularly, commercial plantings have been made of the York Imperial, the Winesap, and Ben Davis. Where proper air and water drainage are secured, and where altitudes are chosen within which the fruit buds are not liable to be killed by unseasonable frosts, the Cecil clay is well suited to the production of these varieties of red apples. In general, however, the planting should be upon the scale of home use rather than on the commercial scale, since other types of soil in the Piedmont section are fully as well suited to the production of apples. Pears are grown to a limited extent on the Cecil clay, chiefly in Virginia.

FARM EQUIPMENT.

The inherent characteristics of the Cecil clay render it difficult of tillage with any except heavy teams and the heavier farming tools. The one-horse plow is totally inadequate for the management of this soil, and wherever any large area of the type occurs upon a single farm the equipment should be that of a heavy two or three horse team and the heavy turnplow or disk plow. The thorough stirring and modification of the surface soil by tillage operations can only be accomplished by equipment of this character. Wherever the configuration of the land surface is sufficiently level the disk plow and disk harrow can be used to excellent advantage upon this soil type. These implements cut, break, and pulverize the stiff surface soil without leaving an impacted plowsole or "hardpan." They permit of the preparation of a well-granulated and permeable surface soil capable not only of absorbing a large portion of the rainfall over its surface, but also of storing and retaining this moisture supply for the use of corn, cotton, and those other farm crops which are the heaviest

users of soil moisture. Even where erosion has seriously reduced the producing capacity of the Cecil clay through the constant removal of the friable surface soil, the use of the heavier farm machinery for the purposes of deeper plowing and cultivation will restore such fields to normal productiveness within a few years time, if care be also taken to grow the leguminous crops in proper rotation and to restore organic matter. These tillage requirements are paramount in the proper conduct of farming operations on the Cecil clay, owing to its fine-grained texture and dense compact structure. For the purposes of intertillage with either cotton, corn, or tobacco, the spiked-tooth harrow is far superior to the small turning plow or any other type of cultivator except the disk machinery. Frequent and shallow cultivation, in order to prevent the formation of a baked surface crust, is one of the essentials in the treatment of this soil, as has already been shown.

The crop adaptations of the Cecil clay also point strongly to the desirability of utilizing the corn, oats, and hay produced upon this type for the support of beef cattle and of dairy herds. The entire Piedmont section is rapidly becoming the scene of active manufacturing operations, and the concentration of population in the manufacturing cities throughout this section requires the local production of meats and dairy products for the sustenance of this population. It has been estimated that not over 20 per cent of the meat consumed in the Piedmont region is produced within it, and it is certain that not over 25 per cent of the dairy products there consumed originate in the Piedmont section. Within the immediate vicinity of all of these growing manufacturing cities there are abundant opportunities for the occupation of such farms as consist principally of the Cecil clay for the purposes of dairying and the accessory production of meat, particularly veal and pork. The climate is cool, the seasons are long, the forage crops of the greatest value in meat and milk production may all be grown to advantage. The region is well watered, and the rougher and more eroded portions, particularly of the Cecil clay, may well be laid down to bluegrass, Bermuda grass, or other permanent pasturage, thus bringing about the occupation of land which would otherwise be waste and of no utility in the general farming operations. It is not necessary that a single acre of cotton, of tobacco, or of other staple crops should be displaced in order to build up a considerable live stock and dairy industry through the utilization of areas of the Cecil clay which are now nonproductive in the ordinary plan of agricultural industry in the southern Piedmont section.

In fact, a greater production of cotton, tobacco, wheat, and oats would rapidly ensue, provided the resulting organic manures were properly applied to the hoed crops in the readjusted rotation.

The Cecil clay will undoubtedly play a very important part in the further development of the production of the small grains, of the forage crops, and of meats and dairy products in the Piedmont Plateau.

In the more northern sections where the Cecil clay is found the equipment of farm buildings is usually ample, and the dwelling houses, barns, and outbuildings are of substantial construction upon a large scale. Throughout the Piedmont region in eastern Pennsylvania, Maryland, Virginia, and the northern part of North Carolina many of these old farmhouses are built of the local rock or of brick. They are the evidences of prosperous farming, based largely upon the capabilities of the Cecil clay. They are the relics of the time, before the opening of the western prairie regions, when a considerable proportion of the wheat consumed in the United States was produced upon this soil type. Such equipment, whenever it is justified by the prosperity of the individual farm family, is well suited to the needs of the highest type of agriculture which may be developed upon this essentially general farming soil. The character of the crops produced, the desirability for accessory animal husbandry, and the climatic conditions surrounding the type all require a more complete equipment in live stock, tools, and farm buildings than is required by some of the more sandy special-crop types of soil in the Piedmont and in other regions.

SUMMARY.

The Cecil clay is an extensive soil type second only to the Cecil sandy loam in its extent of development in the Piedmont soil province.

It is a strong, fertile, productive soil for the production of general farm crops in all locations where it is properly protected from erosion and given fair treatment as to tillage and the restoration of organic matter.

The Cecil clay, because of its stiff, tenacious surface soil and subsoil, is not well suited to the production of any special crops, unless the heavy export tobacco should be considered in this class.

The crops produced to best advantage upon the Cecil clay vary to some extent with the climatic surroundings of the type. Corn, wheat, oats, export tobacco, cotton, and grass are the crops best suited to this type. Apples are produced to a limited degree and pears in a few localities.

For its improvement deeper plowing, more thorough tillage, and the incorporation of considerable amounts of organic matter are requisite. Liming proves beneficial in connection with the production of leguminous crops.

The soil is well drained and well located with regard to healthful surroundings.

A large proportion of the type is occupied for farming purposes and the area under cultivation may well be extended if proper precautions for the prevention of soil erosion are observed.

It is well suited to support dairying and animal industry and requires full equipment of heavy teams and tools and commodious farm buildings.

The Cecil clay is the strongest general-purpose soil in the southern Piedmont section.

Approved.

JAMES WILSON,
Secretary of Agriculture.

APPENDIX.

The following table shows the extent of the Cecil clay in the areas surveyed to this time.

In the first column is stated the particular soil survey in which the soil was encountered; in the second column, its extent of development in acres; and in the third column, the volume of the Field Operations of the Bureau of Soils, in which the report upon the area may be found. Those desiring a detailed description of the soil and of the general conditions which surround it in any particular area may consult these volumes in almost any public library.

Areas of the Cecil clay encountered in the soil survey.

Survey.	Area of soil.	Year of publication, Field Operations.	Survey.	Area of soil.	Year of publication, Field Operations.
Alabama:	*Acres.*		Pennsylvania:	*Acres.*	
Lee County	9,536	1906	Chester County	1,088	1905
Georgia:			South Carolina:		
Cobb County	166,130	1901	Abbeville area	332,992	1902
Covington area	99,130	1901	Anderson County	164,032	1909
Franklin County	82,240	1909	Campobello area	187,443	1903
Pike County	30,080	1909	Cherokee County	22,592	1905
Spalding County	66,560	1905	Lancaster County	114,752	1904
Maryland:			Oconee County	48,448	1907
Cecil County	12,500	1900	Saluda County	29,760	1909
Harford County	39,890	1901	York County	185,152	1905
Leesburg area, Va	448	1902	Virginia:		
North Carolina:			Albemarle area	79,680	1902
Alamance County	101,370	1901	Appomattox County	31,232	1904
Cary area	2,960	1901	Bedford area	142,730	1901
Caswell County	15,040	1908	Campbell County	23,680	1909
Gaston County	10,368	1909	Hanover County	7,360	1905
Hickory area	120,704	1902	Leesburg area	31,552	1903
Raleigh to Newbern area	2,030	1900	Louisa County	7,168	1905
Statesville area	289,590	1901	Prince Edward area	31,590	1901